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PISTON PIN BUSHING

Description

The present invention concerns a piston pin bushing made from a copper zinc alloy.

Piston pin bushings have been produced up to now i.a. using forgeable copper zinc alloys, in particular CuZn31Si. The forgeable alloy is thereby initially continuously cast into a tubular section. This tubular section is then forged, i.e. pulled through a drawing die, thereby roughly determining the outer and inner shape and also influencing the structure through forging. This is optionally followed by thermal treatment (re-crystallization annealing). Bushings are cut out from the section obtained in this manner, the outer sides of which are subjected to machining. The bushings obtained in this manner are pressed into a piston. The opening is then cut on a lathe, i.e. while rotating the workpiece, in order to provide the opening with a defined structure and configuration relative to the piston (so-called shaped bore) in the predetermined orientation of the bushing relative to the piston.

Departing therefrom, it is the object of the present invention to produce a piston bushing in a more economical fashion.

This object is achieved in accordance with the invention by a piston pin bushing comprising the features of claim 1.

Forging of the piston pin bushing material after continuous casting is deliberately omitted. This can be subsequently detected in the structure of the piston pin bushing.

Piston pin bushings are subjected to great wear due to temperature, pressure and impact load caused by ignition pressure. It has been assumed for a long time that forging was absolutely necessary in order to obtain this large strain resistance by changing the cast structure into a forgeable structure. In accordance with the invention, it has been determined that forging can be omitted with use of the claimed alloy, thereby still obtaining excellent results, which are even better than those of conventional forgeable CuZn31Si alloys.

Preferred embodiments of the inventive piston pin bushing can be extracted from the dependent claims.

The claimed invention is also directed to a method of producing a piston pin bushing comprising the features of claim 5. The piston pin bushing obtained in this manner can be pressed into the piston pin opening of the piston without further cutting. When it has been pressed in, the shaped bore is provided.

Figs. 1 and 2 show the results of comparative measurements of the wear rate.

Comparative measurements were performed, wherein a series piston pin bushings of a forgeable CuZn31Si alloy and an inventive piston pin bushing of a CuZn30Al2NiMnFe alloy were compared in an engine having a nominal power of 96kW at 4000 revolutions/min. The wear rate in nm/h was determined, i.e. the thermally higher loaded piston pin bushing of the piston (compared to the coolant channel inlet), averaged over an

area of 12mm x 22mm in the main load region (the apex region facing the bottom), was examined with respect to wear. The measurement results are shown in the diagram of Fig. 1. One can see the wear rate in dependence on the rotational speed and the load.

Fig. 2 shows the result of the determined wear rate of the two bushings at full load (4000 revs/min) in dependence on the lubricant temperature in the main channel of the engine.

The figure shows that the inventive piston pin bushing is by far superior to the series bushing of a forgeable CuZn31Si alloy although it has not been forged during production.